Amount of Fill Allowed for Restoration in the Bay

Policy Challenge

BCDC was founded to prevent Bay Fill. Because Bay Fill can have impacts on Bay habitats, previous policy has strictly limited the amount of Bay Fill that can be placed in habitats, even for improvement projects including habitat restoration, enhancement, or creation. With Sea Level Rise, more fill may be necessary to save habitats from drowning, and to make habitats more resilient so they can better adapt to sea level rise. How do you define "minor"? We may need large volumes of fill for sea level rise adaptation that would be hard to define as "minor".

BCDC's Current Laws and Policies

- **Fish, Other Aquatic Organisms, and Wildlife Policy 5**: The Commission may permit **a minor amount of fill** or dredging in wildlife refuges, shown on the Plan Maps, necessary to enhance fish, other aquatic organisms and wildlife habitat or to provide public facilities for wildlife observation, interpretation and education.
- **Tidal Marshes Policy 8**: Based on scientific ecological analysis and consultation with the relevant federal and state resource agencies, **a minor amount of fill** may be authorized to enhance or restore fish, other aquatic organisms or wildlife habitat if the Commission finds that no other method of enhancement or restoration except filling is feasible.
- **Subtidal Areas Finding j**: Fill material, such as rock, oyster shells and sediments dredged from the Bay, can enhance or beneficially contribute to the restoration of subtidal habitat by: (1) creating varied subtidal areas beneficial to aquatic species, such as Pacific herring; (2) restoring native oyster reefs; (3) enhancing subtidal plant communities, such as eelgrass beds; and (4) recreating the bathymetry of disturbed areas, such as dredged channels.

Policy Options

Policy	Pros	Cons
Remove "minor amount of fill" language, and rely on the language in the McAteer Petris Act	The McAteer Petris Act already requires that applicants carefully consider fill volume, but does not add an additional subjective restriction. This would hold all projects to the same fill volume standard.	Removal could result in much larger volumes of fill in the Bay, and additional language may be necessary to ensure that this proceeds in a desirable way
Replace "minor amount of fill" language with another term	Language specifically addressing the volume of Bay fill allowed for habitat projects could provide better guidance to regulators and applicants	This language may still create additional restrictions or be redundant with the McAteer Petris Act
Add language emphasizing that large volumes of fill may be necessary to prevent certain habitat elements from drowning	This would provide important justification of changes to the "minor amount of fill" language	
Add specifications of fill dynamics that should be considered in determining the minimum amount necessary (e.g. settling rate, how compact material will become)	It is important to consider physical sediment dynamics in determining the "minimum amount" of fill necessary	In some cases this information may be difficult or more expensive/time consuming for applicants to provide

Other Solutions

Solution	Pros	Cons
Develop a guidance document on best practices of placing fill in the Bay for habitat restoration, creation, or enhancement.	If larger volumes of Bay fill are permitted, guidance on best practices for fill placement for different purposes would benefit both applicants and permit analysts	The best science on this information may be changing frequently, and the production of such a document may require more resources than available

Amount of Beneficial Reuse Allowed for Restoration in the Bay

Policy Challenge

The beneficial reuse of dredged sediment for restoration projects will be essential, as sediment supply is limited and we can't afford to have sediment leaving the system. However, Dredging policy 11 restricts the amount of dredged material that can be used for restoration in the Bay to a "minor amount". Of the three conditions of this restriction, the first has been accomplished, and the second and third are still underway.

BCDC's Current Laws and Policies

Dredging Policy 11b. To ensure protection of Bay habitats, the Commission should not authorize dredged material disposal projects in the Bay and certain waterways for habitat creation, enhancement or restoration, except for projects using **a minor amount of dredged material**, until:

(1) Objective and scientific studies have been carried out to evaluate the advisability of disposal of dredged material in the Bay and certain waterways for habitat creation, enhancement and restoration. Those additional studies should address the following:

(a)The Baywide need for in-Bay habitat creation, enhancement and restoration, in the context of maintaining appropriate amounts of all habitat types within the Bay, especially for support and recovery of endangered species; and

(b)The need to use dredged materials to improve Bay habitat, the appropriate characteristics of locations in the Bay for such projects, and the potential short-term and cumulative impacts of such projects; and

(2)The Commission has adopted additional Baywide policies governing disposal of dredged material in the Bay and certain waterways for the creation, enhancement and restoration of Bay habitat, which narratively establish the necessary biological, hydrological, physical and locational characteristics of candidate sites; and

(3) The Oakland Middle Harbor enhancement project, if undertaken, is completed successfully.

Policy Options

Policy	Pros	Cons
Remove subsection (3), requiring the successful completion of Middle Harbor	Removal of this subsection would ensure that the beneficial reuse of much needed sediment for habitat projects Baywide is not restricted by a single, unrelated project	Other elements of the policy still impose restrictions on the beneficial reuse of sediment for habitat projects
Remove Dredging policy 11 b	Removal of this policy would remove a major restriction on the beneficial reuse of dredged sediment for habitat projects	
Replace language of Dredging policy 11b with additional language encouraging the beneficial reuse of dredged material	Additional language could further support and encourage the use of dredged material for beneficial habitat projects wherever possible	

Other Solutions

Solution	Pros	Cons

Regional goals • Restoring complete ecosystems

Policy Challenge

It is important for restoration and multi-benefit shoreline protection projects to allocate limited resources (sediment, funding, etc.) to restore habitats where it makes the most sense to do so, both from a sustainability perspective (i.e. can the habitat or shoreline defense strategy be sustained there, even with sea level rise), and from a habitat needs perspective. Sites that are well-suited for these purposes have been assessed in the BEHGU, OLUs, and Subtidal habitat goals. While some findings and policies recommend working within these frameworks, more explicit statement of projects' integration in these recommendations would be useful. Also, there is only reference to one of these frameworks, and even that one is outdated. Reference to specific documents will inevitably lead to the findings and policies becoming outdated.

BCDC's Current Laws and Policies

- **Tidal Marshes and Tidal Flats Finding a**: San Francisco Bay is comprised of a diversity of habitats. These habitats were formed and are sustained by the global forces of climate and sea level change, as well as the more local effects of topography; the ebb and flow of the daily tides; the volume, timing and location of fresh water inflow; and the availability and types of sediments on the bottom of the Bay and suspended in the water column. Bay habitats include subtidal areas, tidal flats, and tidal marsh; Bay-related habitats include diked baylands, such as salt ponds, managed marsh and agricultural baylands. Plants and animals require a variety of habitats to survive. For example, topsmelt (a fish species) utilize the shallow, protected sloughs of tidal marshes of the Bay, as well as open water during different times in their life cycle and daily feeding routine. The topsmelt is also food for many species of birds that inhabit the tidal marshes and upland areas surrounding the Bay.

- **Tidal Marshes Policy 4**: Where feasible, former tidal marshes and tidal flats that have been diked from the Bay should be restored to tidal action in order to replace lost historic wetlands or should be managed to provide important Bay habitat functions, such as resting, foraging and breeding habitat for fish, other aquatic organisms and wildlife. As recommended in the Baylands Ecosystem Habitat Goals report, around 65,000 acres of areas diked from the Bay should be restored to tidal action to maintain a healthy Bay ecosystem on a regional scale. Regional ecosystem targets should be updated periodically to guide conservation, restoration, and management efforts that result in a Bay ecosystem resilient to climate change and sea level rise. Further, local government land use and tax policies should not lead to the conversion of these restorable lands to uses that would preclude or deter potential restoration. The public should make every effort to acquire these lands for the purpose of habitat restoration and wetland migration.

Policy Options

Policy	Pros	Cons
Include more information emphasizing the importance of restoring complete ecosystems and what that entails	This will formalize BCDC's commitment to support and adhere to concepts presented in the Baylands Ecosystem Habitat Goals Update	
Include more information and recommendations on restoring subtidal areas around the Bay	The findings and recommendations of the Subtidal Habitat Goals Report should be incorporated into the Bay Plan where appropriate	
Add information about the concept of operational landscape units and how a project's sustainability can be determined using this framework	This will ensure that the most recent science on the sustainability of habitat and shoreline protection projects is captured in the Bay Plan	Specific reference to a current paradigm may limit future work unintendedly. May be better to refer to best available science.
Require information from applicants on how the project will work to achieve the goals of BEHGU, Subtidal Habitat Goals, and conform with the recommendations of Adaptation Atlas.	This will ensure that projects are working toward a regional vision of sustainable, site-appropriate habitat and shoreline protection projects	

Other Solutions

Solution	Pros	Cons
Use of the BRRIT to assess how projects fit within regional restoration priorities and to consider the impacts of projects together, rather than on a case by case basis.	Makes use of an already existing entity to enhance coordination and adherence to regional visions	
Amend Bay Plan Maps to add in elements of BEHGU/OLU/subtidal priorities	Provides an additional regulatory tool to ensure that projects are sustainable and well-sited	

Design • Pilots • Uncertainty • Monitoring • Adaptive Management

Policy Challenge

With rising sea level, it is unclear how exactly projects will change in the next 10, 20, 30 years etc. Moreover, many of the methods and approaches to fill for habitat that may be proposed are untested in the Bay. In deciding how much fill to allow in a given project, strong monitoring and adaptive management plans will be essential to address this uncertainty. Pilot/demonstration projects should also be encouraged as an additional information gathering mechanism to ultimately decide how much fill and how to place fill in the most appropriate way.

BCDC's Current Laws and Policies

- **Tidal Marshes Policy 6**: Any ecosystem restoration project should include clear and specific long-term and short-term biological and physical goals, and success criteria, and a monitoring program to assess the sustainability of the project. Design and evaluation of the project should include an analysis of: (a) how the system's adaptive capacity can be enhanced so that it is resilient to sea level rise and climate change; (b) the impact of the project on the Bay's sediment budget; (c) localized sediment erosion and accretion; (d) the role of tidal flows; (e) potential invasive species introduction, spread, and their control; (f) rates of colonization by vegetation; (g) the expected use of the site by fish, other aquatic organisms and wildlife; (h) an appropriate buffer, where feasible, between shoreline development and habitats to protect wildlife and provide space for marsh migration as sea level rises; and (i) site characterization. If success criteria are not met, appropriate adaptive measures should be taken.
- **Subitdal Areas Policy 5**: The Commission should continue to support and encourage expansion of scientific information on the Bay's subtidal areas, including: (a) inventory and description of the Bay's subtidal areas; (b) the relationship between the Bay's physical regime and biological populations; (c) sediment dynamics, including sand transport, and wind and wave effects on sediment movement; (d) areas of the Bay used for spawning, birthing, nesting, resting, feeding, migration, among others, by fish, other aquatic organisms and wildlife; and (e) where and how restoration should occur.
- **Climate Change Policy 5**: Wherever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged.
- **Climate Change Finding i**: Adaptive management is a cyclic, learning-oriented approach that is especially useful for complex environmental systems characterized by high levels of uncertainty about system processes and the potential for different ecological, social and economic impacts from alternative management options. Effective adaptive management requires setting clear and measurable objectives, collecting data, reviewing current scientific observations, monitoring the results of policy implementation or management actions, and integrating this information into future actions.

Policy Options

Policy	Pros	Cons
Include language requiring that projects have an adaptive management plan, and stating what adaptive management plans should entail	Adaptive management plans increase the project's likelihood of success, and allow for more uncertainty at the time of permit approval	Not all projects may have the budget or need to complete or adhere to an adaptive management plan
Add language stating that the level of design, amount of monitoring, and intensity of adaptive management plan required for a habitat restoration project should scale with the project goals, size, impact, level of uncertainty, and expected duration (lifetime).	This would ensure that projects do not need to do more design, monitoring, or management than is necessary or appropriate for the project.	The proper level of design, monitoring, or management for a given project may be subjective and/or difficult to determine
Add a brief summary of lessons learned from monitoring, and/or more specific policies on monitoring requirements	This would increase consistency in BCDC's monitoring requirements	
Add policy language to ensure that applicants are able to financially and logistically support monitoring and adaptive management needs	It would be easier to guarantee that projects will adhere to goals and be "successful" if applicants have the funding in place for ongoing monitoring and management	Some valuable and well-designed projects may not have funds to ensure these activities at the time of permit approval

Other Solutions

Solution	Pros	Cons
Develop a regionwide/programmatic permit for pilot restoration projects and/or restoration projects in general	Such a permit may streamline the permitting process for restoration projects, and perhaps make it so they do not need to do as much intensive design/impact assessment early in the permitting process	Could potentially allow projects with a higher chance of negative impacts or failure (including those that lack clear, solid goals and design) to be approved
Create a monitoring guidance document	Increase consistency in BCDC's monitoring requirements	

Impacts and Habitat Type Conversion caused by fill

Policy Challenge

Many fill applications that may be necessary to prevent habitats from drowning with sea level rise may also have negative impacts on those habitats. This includes projects that convert one type of habitat to another. While fill may have impacts on the Bay, in some cases these impacts may be less than the harm expected by habitat loss from sea level rise.

BCDC's Current Laws and Policies

- **FOAOW Finding e**: All parts of San Francisco Bay are important for the perpetuation of fish, other aquatic organisms and wildlife because any reduction of habitat reduces their numbers in some measure.
- **FOAOW Policy 1**: To assure the benefits of fish, other aquatic organisms and wildlife for future generations, to the greatest extent feasible, the Bay's tidal marshes, tidal flats, and subtidal habitat should be conserved, restored and increased.
- **Tidal Marshes Policy 2**: Any proposed fill, diking, or dredging project should be thoroughly evaluated to determine the effect of the project on tidal marshes and tidal flats, and designed to minimize, and if feasible, avoid any harmful effects.
- **Tidal Marshes Policy 3**: Projects should be sited and designed to avoid, or if avoidance is infeasible, minimize adverse impacts on any transition zone present between tidal and upland habitats. Where a transition zone does not exist and it is feasible and ecologically appropriate, shoreline projects should be designed to provide a transition zone between tidal and upland habitats.
- **Subtidal Areas Policy 2**: Subtidal areas that are scarce in the Bay or have an abundance and diversity of fish, other aquatic organisms and wildlife (e.g., eelgrass beds, sandy deep water or underwater pinnacles) should be conserved. Filling, changes in use; and dredging projects in these areas should therefore be allowed only if: (a) there is no feasible alternative; and (b) the project provides substantial public benefits.

Policy Options

Policy	Pros	Cons
Add language noting the potential impacts that may be associated with restoring complete ecosystems and creating valuable habitat (e.g. creating new marshes, subtidal habitat, islands, etc.)	Serves to remind applicants and analysts to use caution and think about a suite of potential outcomes when considering projects that allow large volumes of fill in the Bay	
Add requirements to analyze the relative impacts and benefits of fill to make habitats better adapted to sea level rise	Helps applicants and analysts to assess whether it is appropriate to fill a given site for sea level rise adaptation	Impacts and benefits may be difficult to determine for fill methods that have not been used in the Bay
Require that applicants and analysts examine the impacts of habitat loss or type conversion on regional and subregional habitat availability and needs. Think about cumulative impacts of all projects, as opposed to individual project impacts	Reduces the risk of cumulative impacts, and encourages consideration of the regionwide habitat requirements for all Bay organisms	

Other Solutions

Solution	Pros	Cons
Develop a detailed guidance framework to facilitate the determination of acceptable fill impacts or habitat type conversion, and appropriate mitigation when necessary.	In addition to policy, this would further help applicants and analysts to assess whether it is appropriate to fill a given site for sea level rise adaptation	
Create GIS layers that could demonstrate ideal sites for restoration, protection, and habitat type conversion based on species distributions, manner and extent of species use of various sites, (natural) community distributions, and physical processes that sustain habitats.	This information would support a guidance framework, and would help applicants and analysts to determine which sites are best suited for fill for various habitat restoration/enhancement purposes	Layers would need to be maintained and updated with the most recent data. Due to limited costs and personnel, these tools may be difficult to maintain.

Fill for Natural Shoreline Protection and Multi-Benefit projects

Policy Challenge

The bay plan does contain language on natural infrastructure/use of natural features for shoreline protection, and on the co-benefits of habitat restoration/shoreline protection. However, co-benefits and desire to use natural features over hard shoreline protection could be more explicitly stated in the natural resource and shoreline protection policies.

BCDC's Current Laws and Policies

- **Climate Change Policy 5**: Wherever feasible and appropriate, effective, innovative sea level rise adaptation approaches should be encouraged.
- **Shoreline Protection Finding a**: Well-designed shoreline protection projects, such as levees, wetlands, or riprap, can prevent shoreline erosion and damage from flooding.
- **Shoreline Protection Finding f**: Nonstructural shoreline protection methods, such as tidal marshes, can provide effective flood control, but are typically effective for erosion control only in areas experiencing mild erosion. In some instances, it may be possible to combine habitat restoration, enhancement or protection with structural approaches to provide protection from flooding and control shoreline erosion, thereby minimizing the shoreline protection project's impact on natural resources.
- **Shoreline Protection Policy 4**: Whenever feasible and appropriate, shoreline protection projects should include provisions for nonstructural methods such as marsh vegetation and integrate shoreline protection and Bay ecosystem enhancement, using adaptive management. Along shorelines that support marsh vegetation, or where marsh establishment has a reasonable chance of success, the Commission should require that the design of authorized protection projects include provisions for establishing marsh and transitional upland vegetation as part of the protective structure, wherever feasible.

Policy Options

Policy	Pros	Cons
Add language about operational landscape units (OLUs) and the use of this framework for determining the best shoreline protection strategies for different parts of the Bay.	This will ensure that the most recent science on the sustainability of multi-benefit shoreline protection projects is captured in the Bay Plan	Specific reference to a current paradigm may limit future work unintendedly. May be better to refer to best available science.
Add requirements that natural solutions to shoreline protection should always be used when possible instead of or in addition to hardened shoreline structures, even if the spatial or fill footprint of those natural solutions are larger than hardened shoreline protection.	This would ensure that applicants try to use natural shoreline protection primarily, and consider creative solutions to incorporate natural shoreline protection into all shoreline protection projects	
Make mitigation requirements less intense for natural shoreline protection projects than hardened shoreline protection projects	This further incentivizes the consideration and use of natural shoreline protection	

Other Solutions

Solution	Pros	Cons

Benefits of Bay Fill in the Bay Plan Introduction

Policy Challenge

Although the conclusions and policies in the Bay Plan Introduction don't necessarily hinder restoration projects, they do paint a picture of BCDC's perspective on beneficial fill for restoration that is outdated. While fill certainly can harm the environment, it can also be beneficial and necessary for habitat restoration, creation, and enhancement when used strategically and cautiously.

BCDC's Current Laws and Policies

Major Conclusions and Policies 4: Justifiable Filling. Some Bay filling may be justified for purposes providing substantial public benefits if these same benefits could not be achieved equally well without filling. Substantial public benefits are provided by:

- Developing adequate port terminals, on a regional basis, to keep San Francisco Bay in the forefront of the world's great harbors during a period of rapid change in shipping technology.
- Developing adequate land for industries that require access to shipping channels for transportation of raw materials or manufactured products.
- Developing new recreational opportunities-shoreline parks, marinas, fishing piers, beaches, hiking and bicycling paths, and scenic drives.
- Developing expanded airport terminals and runways if regional studies demonstrate that there are no feasible sites for major airport development away from the Bay.
- Developing new freeway routes (with construction on pilings, not solid fill) if thorough study determines that no feasible alternatives are available.
- Developing new public access to the Bay and enhancing shoreline appearance over and above that provided by other Bay Plan policies-through filling limited to Bay-related commercial recreation and public assembly.

Major Conclusions and Policies 5: Effects of Bay Filling. Bay filling should be limited to the purposes listed above, however, because any filling is harmful to the Bay, and thus to present and future generations of Bay Area residents. All Bay filling has one or more of the following harmful effects:

- Filling destroys the habitat of fish and wildlife. Future filling can disrupt the ecological balance in the Bay, which has already been damaged by past fills, and can endanger the very existence of some species of birds and fish. The Bay, including open water, mudflats, and marshlands, is a complex biological system, in which microorganisms, plants, fish, waterfowl, and shorebirds live in a delicate balance created by nature, and in which seemingly minor changes, such as a new fill or dredging project, may have far-reaching and sometimes highly destructive effects.
- Filling almost always increases the danger of water pollution by reducing the ability of the Bay to assimilate the increasing quantities of liquid wastes being poured into it. Filling reduces both the surface area of the Bay and the volume of water in the Bay; this reduces the ability of the Bay to maintain adequate levels of oxygen in its waters, and also reduces the strength of the tides necessary to flush wastes from the Bay.

Policy Options

Policy	Pros	Cons
Add language noting that substantial public benefits are also provided by restoring, enhancing, or creating ecosystems that increase coastal resilience, provide services such as water filtration and carbon sequestration, and provide habitat for fish, other aquatic organisms, or wildlife	Balances the current language which only refers to built environment and public access/recreation uses as justifiable filling	
Tone down language about negative impacts of Bay Fill in the "Effects of Bay Filling" (Major Conclusions and Policies 5).	Changes the predominantly negative attitude toward Bay Fill in this section to acknowledge that the impacts of Bay Fill are more nuanced.	

Other Solutions

Solution	Pros	Cons